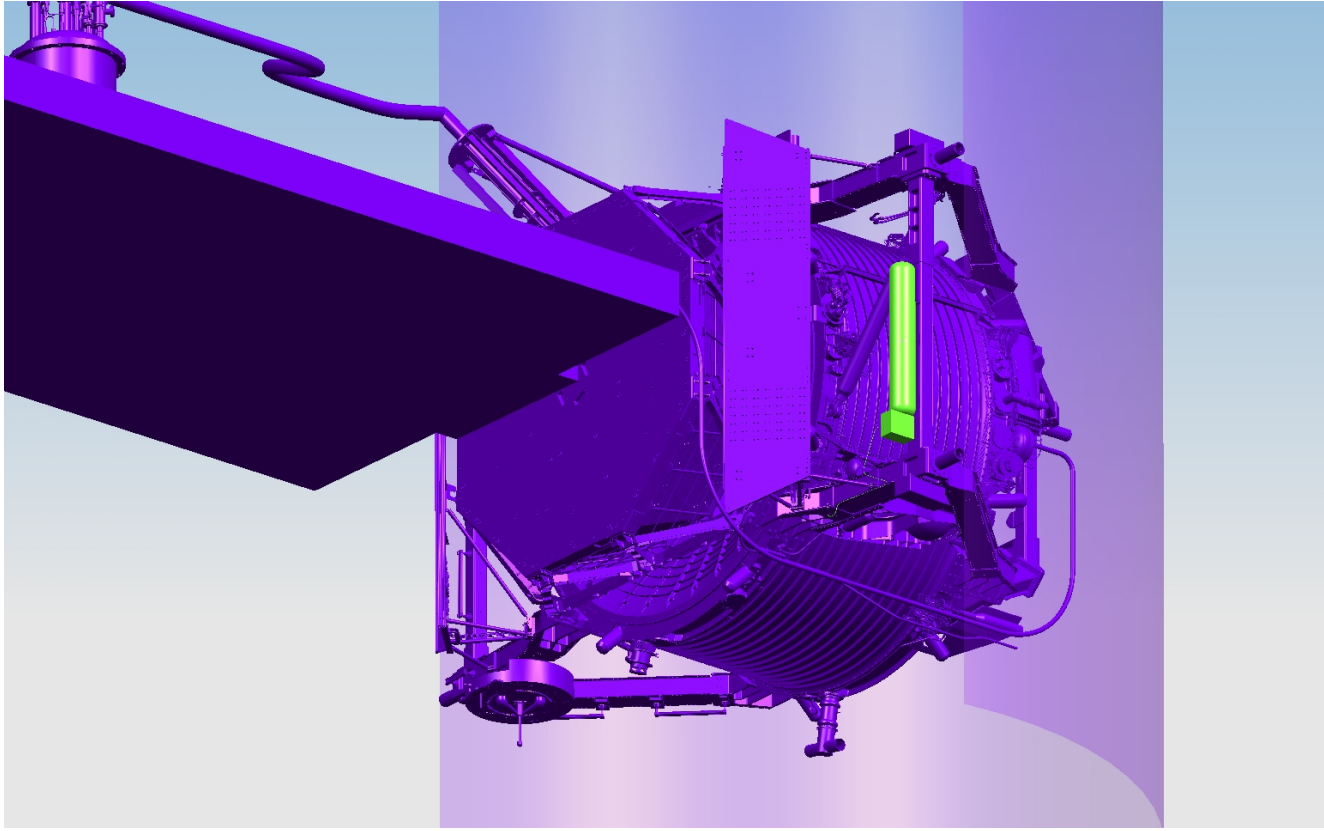


AMS TRD GSE Systems



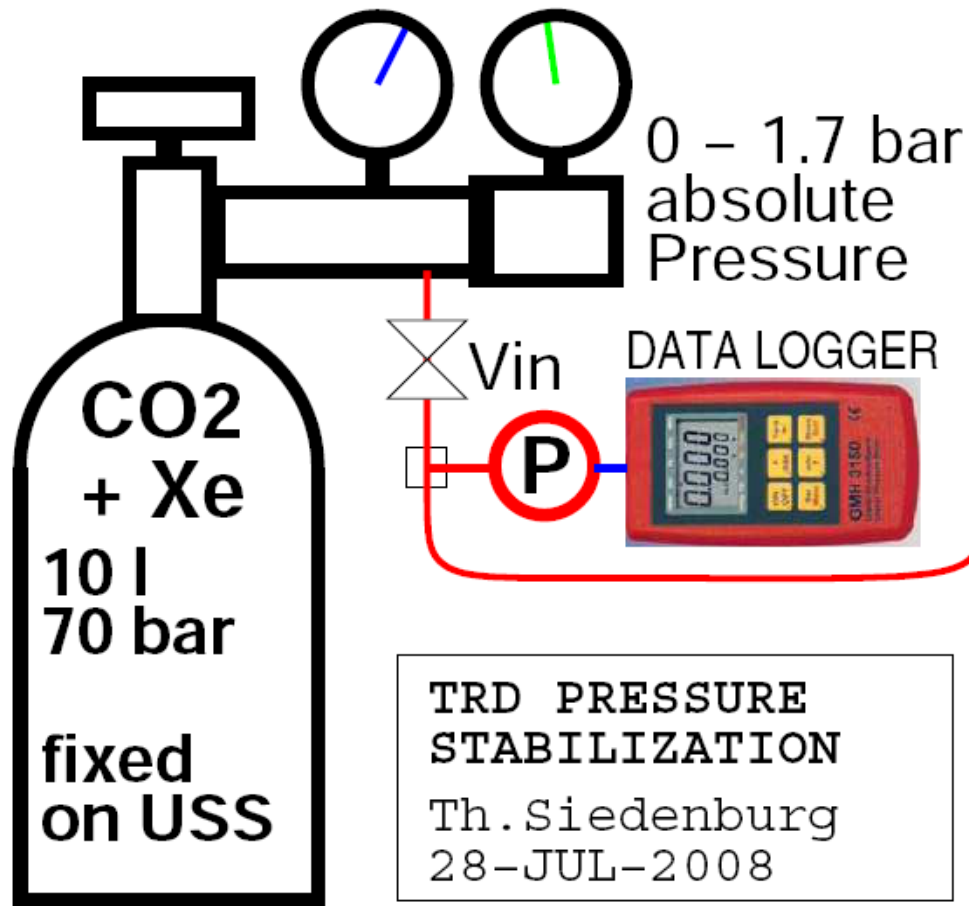
GSE 1: TRD Pressure Stabilization

GSE 2: TRD-GAS Supply Vessel Filling

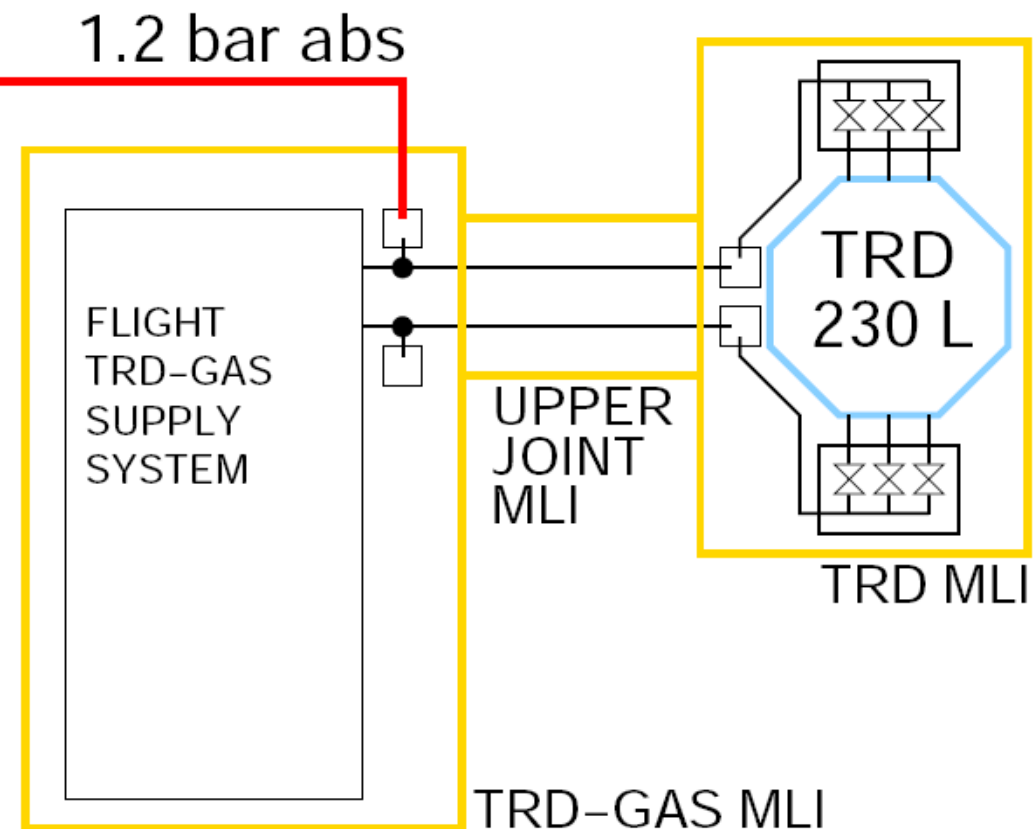
Collaboration of: RWTH Aachen (TRD)
 MIT LNS (TRD-GAS System)

for the collaboration: Th.Siedenburger, MIT

TRD Pressure Stabilization GSE



Commercial Gas Bottle
300 bar proof tested



TRD Straws must be kept above outside pressure to avoid collapsing

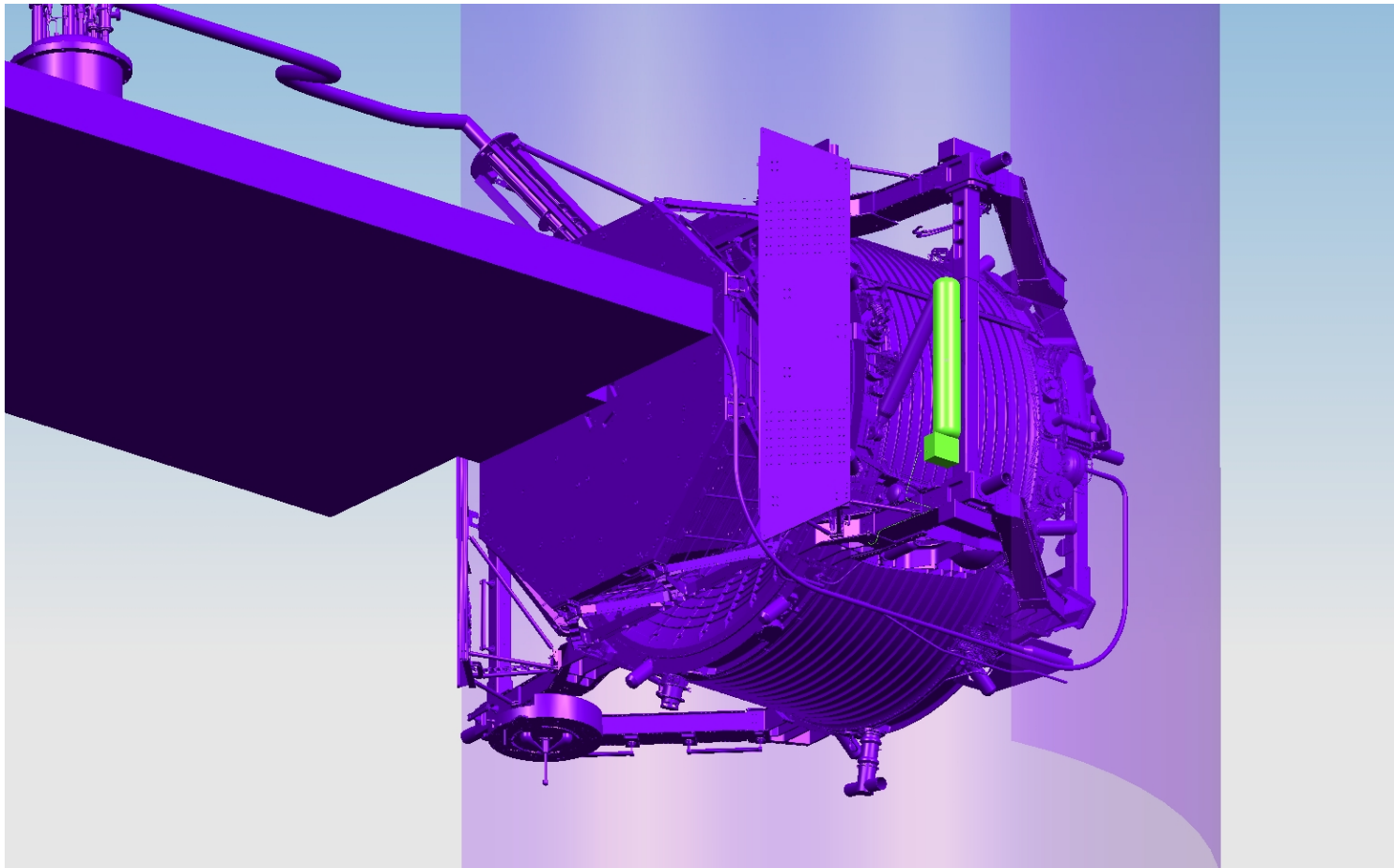
TRD-GAS will monitor gas-loss when AMS is powered ("gastight" = 2l CO2 / week)

Data-Logger to display pressure and record when TRD-GAS is without power

Gas bottle to provide refill without access to AMS (Cargo flight, KSC clear out)
without using up any flight gas stored in TRD-GAS supply vessels

TRD GSE (De)Installation

- Remain Operable during power-outage
up to shuttle launch
- Deinstall with cryomagnet GSE
- Deinstallation: Remove Gas Bottle < 50 lb
Remove Line to GSE connector
Cap and secure GSE connector

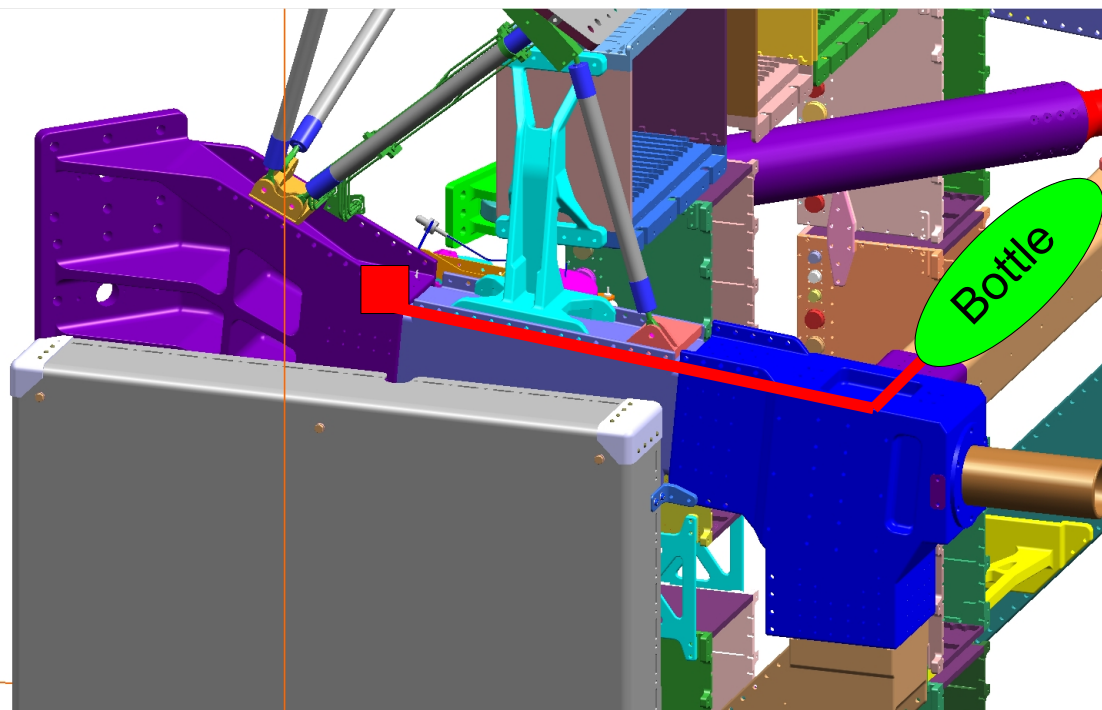
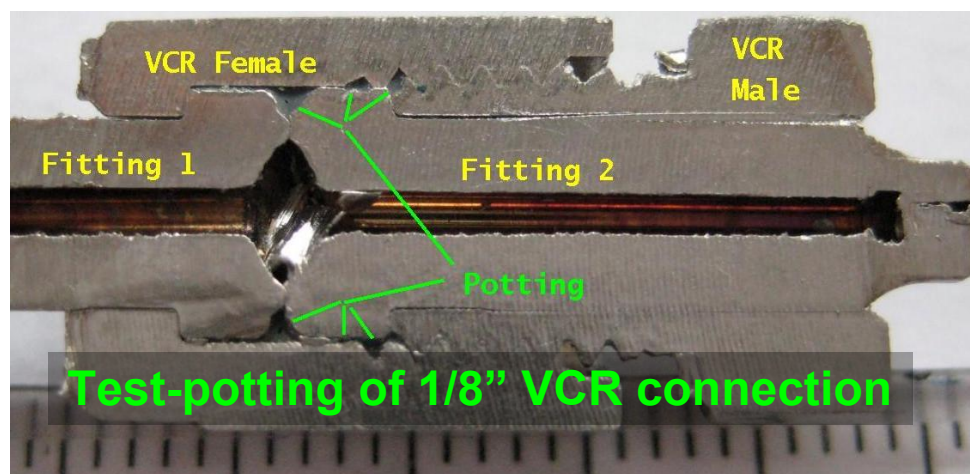


AMS2 in Shuttle Cargo Bay

Accessible in AMS flight configuration
Easy to operate
NASA qualified for launch-pad GSE & flight

=> 1/4" VCR with clip retained gasket
Install blind-plug before flight
Pot against loosening

TRD-GAS GSE Connection



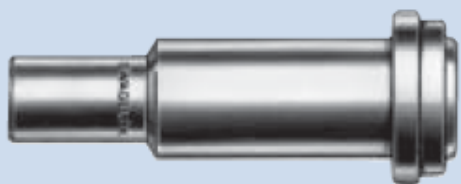
GSE line end
Female nut

Gland

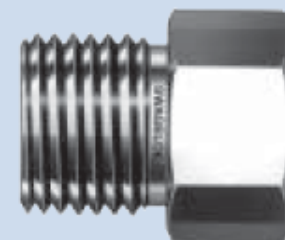
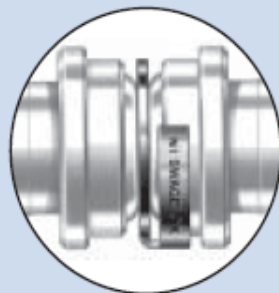
Side-load
retainer gasket

Gland

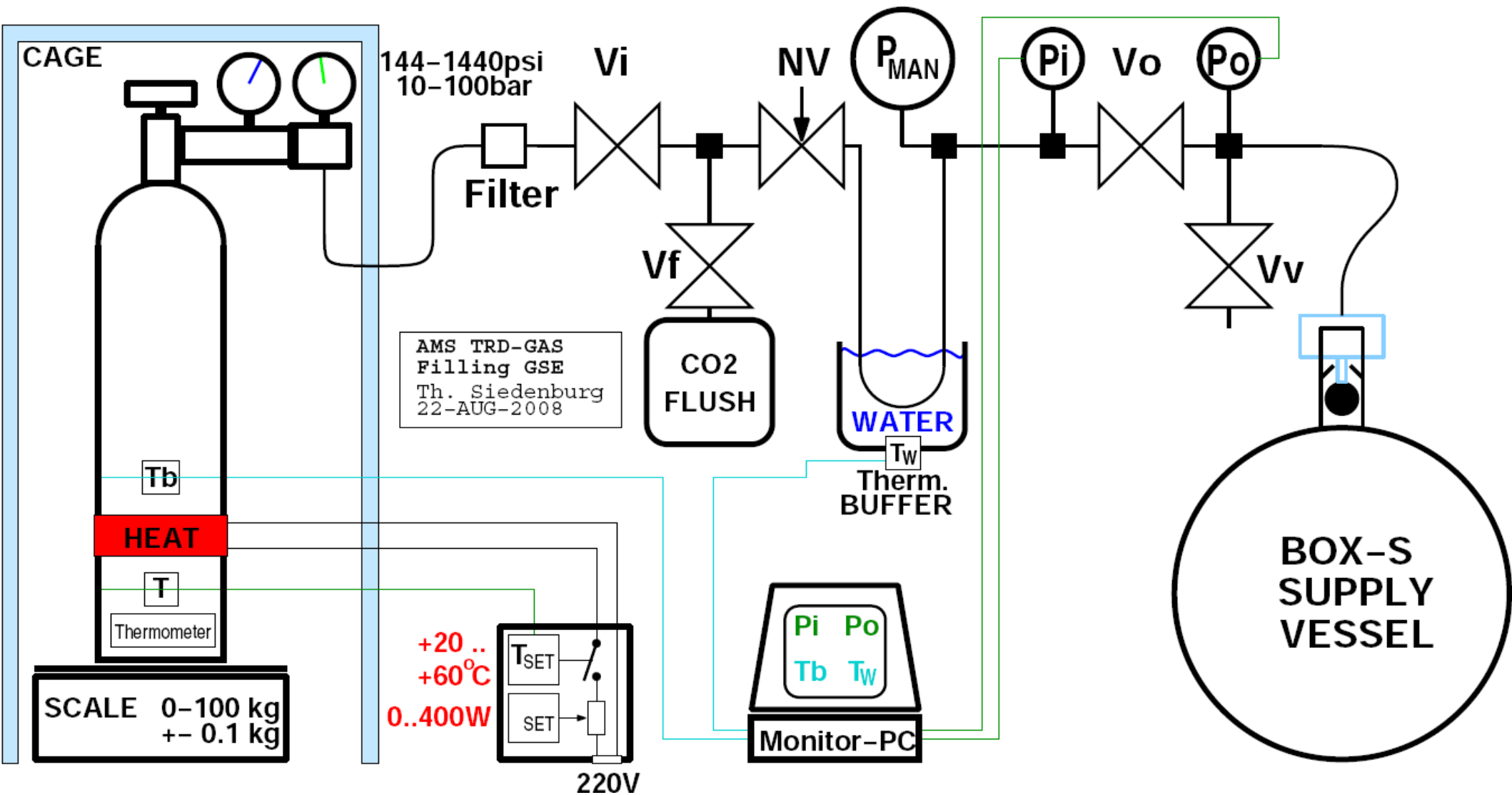
Retained on
Box-C bracket
Male nut



Swagelok SS-4-VCR



TRD-GAS Backup Vessel Filling GSE



Tested successfully for 100% CO₂ transfer at MIT

OPTIONAL USE AT KSC ONLY

TRD-GAS Vessel Filling GSE Operation

- Supply Vessel Filling at KSC only as **BACKUP RECOVERY** from

Pressure Loss in Box-S Supply Vessels
detected during Pre-Launch Wait

- Operation: As part of Payload Preparation

Always manned (by two persons)

Manually controlled Valves

Define Maximum Bottle Pressure before connecting
to avoid supply vessel COPV overfilling

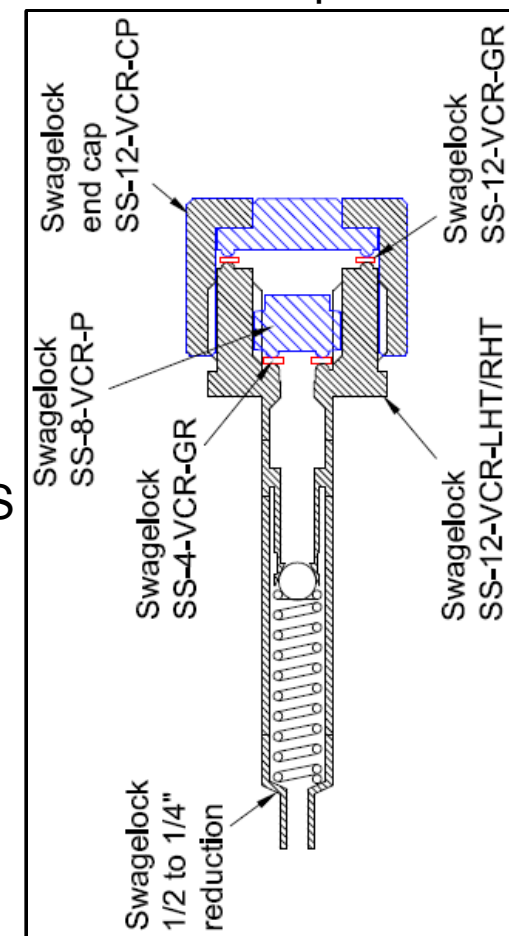
Three manual pressure gages on GSE

Four PC recorded pressure gages on GSE & TRD-GAS

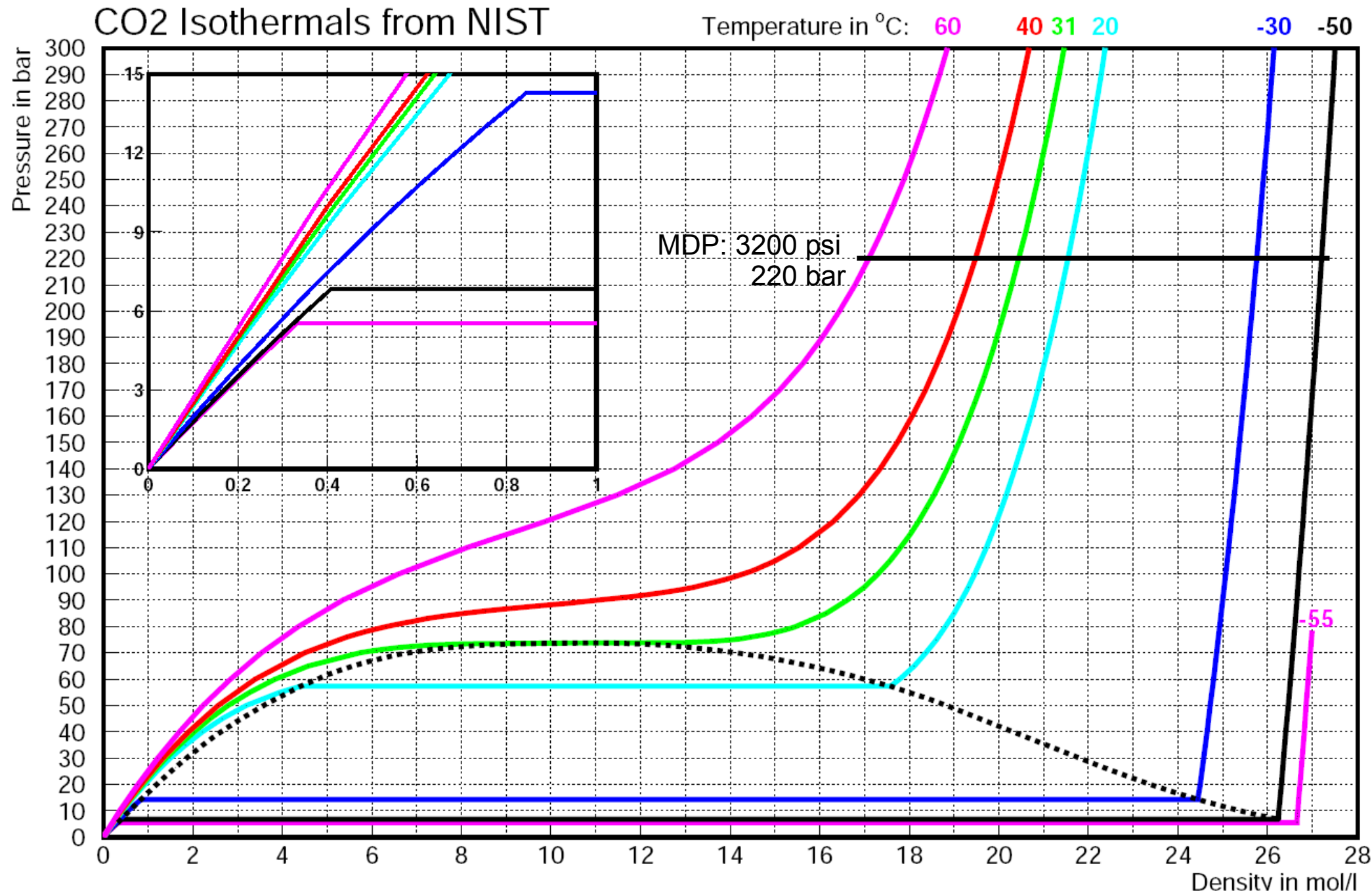
Heated bottle is caged against accidental touching
to allow undisturbed weight measurement

Close TRD-GAS supply vessel fill port (triple-seal)
and remount TRD-GAS debris shield

Fill-Port Triple-Seal



CO₂ NIST ISOTHERMALS



Xenon NIST ISOTHERMALS

